

Regulation (EU) 2016/1628 of the European Parliament and of the Council of 14 September 2016 on requirements relating to gaseous and particulate pollutant emission limits and type-approval for internal combustion engines for non-road mobile machinery, amending Regulations (EU) No 1024/2012 and (EU) No 167/2013, and amending and repealing Directive 97/68/EC (Text with EEA relevance)

Changes to legislation: This version of this Regulation was derived from EUR-Lex on IP completion day (31 December 2020 11:00 p.m.). It has not been amended by the UK since then. Find out more about legislation originating from the EU as published on legislation.gov.uk. (See end of Document for details)

ANNEX II

Exhaust emission limits referred to in Article 18(2)

TABLE II-1: STAGE V EMISSION LIMITS FOR ENGINE CATEGORY NRE DEFINED IN POINT (1) OF ARTICLE 4(1)

Emission stage	Engine sub-category	Power range	Ignition type	CO	HC	NO _x	PM mass	PN	A
		kW		g/kWh	g/kWh	g/kWh	g/kWh	#/kWh	
Stage V	NRE-v-1 NRE-c-1	0 < P < 8	CI	8,00	(HC + NO _x ≤ 7,50)		0,40 ^a	—	1,10
Stage V	NRE-v-2 NRE-c-2	8 ≤ P < 19	CI	6,60	(HC + NO _x ≤ 7,50)		0,40	—	1,10
Stage V	NRE-v-3 NRE-c-3	19 ≤ P < 37	CI	5,00	(HC + NO _x ≤ 4,70)		0,015	1 × 10 ¹²	1,10
Stage V	NRE-v-4 NRE-c-4	37 ≤ P < 56	CI	5,00	(HC + NO _x ≤ 4,70)		0,015	1 × 10 ¹²	1,10
Stage V	NRE-v-5 NRE-c-5	56 ≤ P < 130	DI	5,00	0,19	0,40	0,015	1 × 10 ¹²	1,10
Stage V	NRE-v-6 NRE-c-6	130 ≤ P < 560	DI	3,50	0,19	0,40	0,015	1 × 10 ¹²	1,10
Stage V	NRE-v-7 NRE-c-7	P > 560	all	3,50	0,19	3,50	0,045	—	6,00

a 0,60 for hand-startable, air-cooled direct injection engines.

TABLE II-2: STAGE V EMISSION LIMITS FOR ENGINE CATEGORY NRG DEFINED IN POINT (2) OF ARTICLE 4(1)

Emission stage	Engine sub-category	Power range	Ignition type	CO	HC	NO _x	PM mass	PN	A
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		kW		g/ kWh	g/ kWh	g/ kWh	g/ kWh	#/ kWh	
Stage V	NRG-v-1 NRG-c-1	P > 560	all	3,50	0,19	0,67	0,035	—	6,00

TABLE II-3: STAGE V EMISSION LIMITS FOR ENGINE CATEGORY NRSH DEFINED IN POINT (3) OF ARTICLE 4(1)

Emission stage	Engine sub-category	Power range	Ignition type	CO	HC + NO_x
		kW		g/kWh	g/kWh
Stage V	NRSh-v-1a	0 < P < 19	SI	805	50
Stage V	NRSh-v-1b			603	72

TABLE II-4: STAGE V EMISSION LIMITS FOR ENGINE CATEGORY NRS DEFINED IN POINT (4) OF ARTICLE 4(1)

Emission stage	Engine sub-category	Power range	Ignition type	CO	HC + NO_x
		kW		g/kWh	g/kWh
Stage V	NRS-vr-1a NRS-vi-1a	0 < P < 19	SI	610	10
Stage V	NRS-vr-1b NRS-vi-1b			610	8
Stage V	NRS-v-2a	19 ≤ P ≤ 30		610	8
Stage V	NRS-v-2b NRS-v-3	19 ≤ P < 56		4,40 ^a	2,70 ^a

^a Optionally, as an alternative, any combination of values satisfying the equation $(HC + NO_x) \times CO^{0,784} \leq 8,57$ as well as the following conditions: $CO \leq 20,6$ g/kWh and $(HC + NO_x) \leq 2,7$ g/kWh

TABLE II-5: STAGE V EMISSION LIMITS FOR ENGINE CATEGORY IWP DEFINED IN POINT (5) OF ARTICLE 4(1)

Emission stage	Engine sub-category	Power range	Ignition type	CO	HC	NO_x	PM mass	PN	A
		kW		g/ kWh	g/ kWh	g/ kWh	g/ kWh	#/ kWh	
Stage V	IWP-v-1 IWP-c-1	19 ≤ P < 56	all	5,00	(HC + NO _x ≤ 4,70)		0,30	—	6,00

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Stage V	IWP-v-2 IWP-c-2	$75 \leq P < 110$	all	5,00	(HC + NO _x ≤ 5,40)		0,14	—	6,00
Stage V	IWP-v-3 IWP-c-3	$130 \leq P < 300$	all	3,50	1,00	2,10	0,10	—	6,00
Stage V	IWP-v-4 IWP-c-4	$P \geq 300$	all	3,50	0,19	1,80	0,015	1×10^{12}	6,00

TABLE II-6: STAGE V EMISSION LIMITS FOR ENGINE CATEGORY IWA DEFINED IN POINT (6) OF ARTICLE 4(1)

Emission stage	Engine sub-category	Power range	Ignition type	CO	HC	NO _x	PM mass	PN	A
		kW		g/kWh	g/kWh	g/kWh	g/kWh	#/kWh	
Stage V	IWA-v-1 IWA-c-1	$19 \leq P < 75$	all	5,00	(HC + NO _x ≤ 4,70)		0,30	—	6,00
Stage V	IWA-v-2 IWA-c-2	$75 \leq P < 110$	all	5,00	(HC + NO _x ≤ 5,40)		0,14	—	6,00
Stage V	IWA-v-3 IWA-c-3	$130 \leq P < 300$	all	3,50	1,00	2,10	0,10	—	6,00
Stage V	IWA-v-4 IWA-c-4	$P \geq 300$	all	3,50	0,19	1,80	0,015	1×10^{12}	6,00

TABLE II-7: STAGE V EMISSION LIMITS FOR ENGINE CATEGORY RLL DEFINED IN POINT (7) OF ARTICLE 4(1)

Emission stage	Engine sub-category	Power range	Ignition type	CO	HC	NO _x	PM mass	PN	A
		kW		g/kWh	g/kWh	g/kWh	g/kWh	#/kWh	
Stage V	RLL-c-1	$P > 0$	all	3,50	(HC + NO _x ≤ 4,00)		0,025	—	6,00

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TABLE II-8: STAGE V EMISSION LIMITS FOR ENGINE CATEGORY RLR DEFINED IN POINT (8) OF ARTICLE 4(1)

Emission stage	Engine sub-category	Power range	Ignition type	CO	HC	NO _x	PM mass	PN	A
		kW		g/kWh	g/kWh	g/kWh	g/kWh	#/kWh	
Stage V	RLL-c-1 RLR-v-1	P > 0	all	3,50	0,19	2,00	0,015	1 × 10 ¹²	6,00

TABLE II-9: STAGE V EMISSION LIMITS FOR ENGINE CATEGORY SMB DEFINED IN POINT (9) OF ARTICLE 4(1)

Emission stage	Engine sub-category	Power range	Ignition type	CO	NO _x	HC
		kW		g/kWh	g/kWh	g/kWh
Stage V	SMB-v-1	P > 0	SI	275	—	75

TABLE II-10: STAGE V EMISSION LIMITS FOR ENGINE CATEGORY ATS DEFINED IN POINT (10) OF ARTICLE 4(1)

Emission stage	Engine sub-category	Power range	Ignition type	CO	HC + NO _x
		kW		g/kWh	g/kWh
Stage V	ATS-v-1	P > 0	SI	400	8

Specific provisions on total hydrocarbon (HC) limits for fully and partially gaseous-fuelled engines

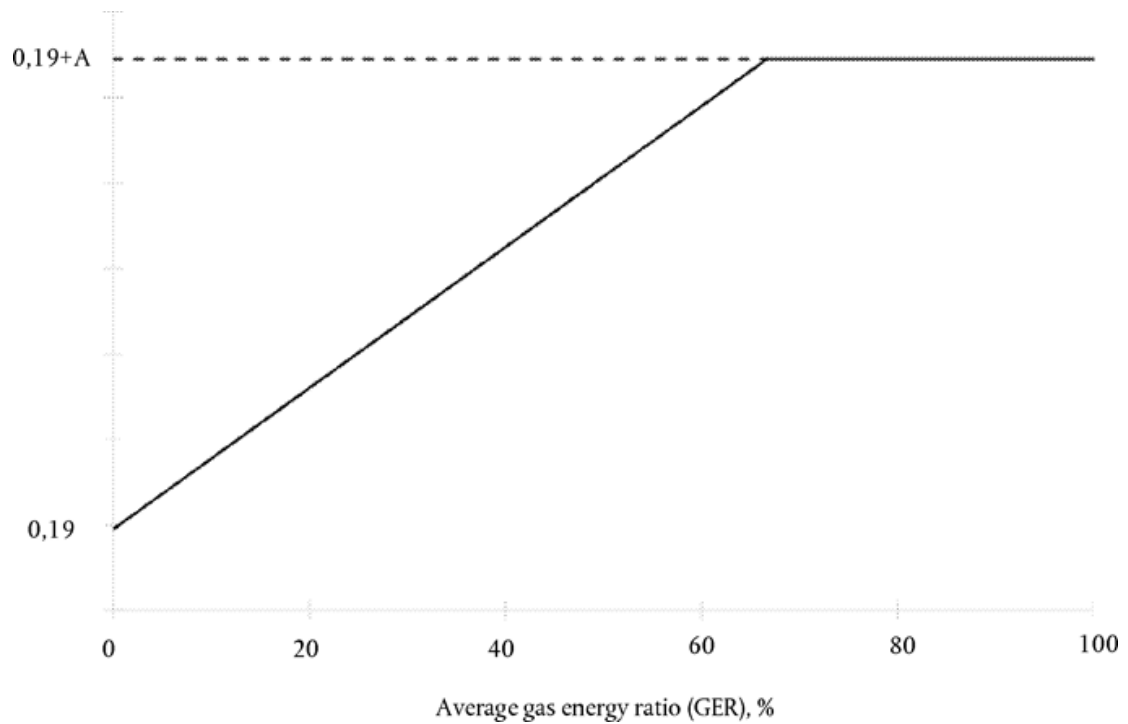
- For the sub-categories where an A-factor is defined, the HC limit for fully and partially gaseous-fuelled engines indicated in Tables II-1 to II-10 is replaced by a limit calculated using the following formula:

$$HC = 0,19 + (1,5 \times A \times GER)$$

where GER is the average gas energy ratio over the appropriate test cycle. Where both a steady-state and transient test cycle apply, the GER shall be determined from the hot-start transient test cycle. Where more than one steady-state test cycle applies, the average GER shall be determined for each cycle individually.

If the calculated limit for HC exceeds the value of $0,19 + A$, the limit for HC shall be set to $0,19 + A$.

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2. For sub-categories with a combined HC and NO_x limit, the combined limit value for HC and NO_x shall be reduced by 0,19 g/kWh and apply for NO_x only.
3. For non-gaseous-fuelled engines, the formula does not apply.

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